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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/887,651	06/21/2001	Kenneth J. Hill	30566.126-US-U1	7098

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EXAMINER

NGUYEN, KIMBINH T

ART UNIT	PAPER NUMBER
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2671

DATE MAILED: 04/15/2004

4

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/887,651

Applicant(s)

HILL, KENNETH J.

Examiner

Kimbinh T. Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 November 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-57 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-57 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This action is responsive to amendment filed 11/26/03.
2. Claims 1-57 are pending in the application.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 18-20, 22-26, 30, 31, 33-39, 41-45, 49, 50 and 52-57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sowar (5,351,196).

Claim 1, Sowar et al. discloses generating a planar profile of curves (generating a slicing plane which is intersected with the solid modeling faces to determine the curves representing regions that the tool may enter; col. 3, lines 24-26 or organizing the curve into profiles, col. 13, lines 9-10); sweeping the profile (constraint curve profile) along a specified path (tool path) to generate a tool body (tool volume; col. 14, lines 9-12); terminating the swept profile when the tool body interacts with blank bodies to a predefined extent (if all delta volumes have been removed, the process terminates, col. 14, lines 36-37); Sowar does not teach predefined extent; however, Sowar discloses "z extents are needed to determine start and stop positions for slicing and control", col. 11, lines 23-27. These features considered corresponding to the step of terminating the

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swept profile when the tool body interacts with a plurality of blank bodies to a predefined extent which disclosed by the claim invention, because Sowar teaches that "this is done by projecting the constraint profile through the z extent of the delta volume" (col. 11, lines 44-60); z extent for a delta volume are maintained and supplied by the underlying solid modeling system (col. 11, lines 19-27). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the Sowar's teaching for using z-extent to stop or terminate the constraint profile by standard interactive techniques, because it would provide a method for automatically generating finishing tool paths for all or portions of delta volumes in a CAD/CAM environment (col. 6, lines 40-42).

Claim 18, Sowar et al. discloses the tool body interacts (intersects) with the blank bodies according to Boolean selected from a group comprising a joining (union) of the tool body (tool volume) with blank bodies (delta volume), a cutting operation (cutting tool to subtract or remove) of the tool body from the blank bodies (col. 2, lines 60-66).

Claim 19, Sowar et al. discloses the tool body is generated by sweeping the profile (tool volume, col. 14, lines 6-12), the tool body extends to a predefined length (z-extend from minimum to maximum z-coordinates values, col. 11, lines 19-27); the tool body extends through the blank body, but no further (from maximum to minimum z); the tool body extents to a first face on the blank body, wherein the first face cuts the tool body; the tool body extends up to, but does not penetrate, a selected face (constraint volumes intersected with the delta volume define the volume which the stool must stay

within; see col. 11, line 44 through col. 12, line 7); the tool body is swept between two selected faces (col. 14, lines 9-12).

Claims 20 and 39, the rationale provide in the rejection of claim 1 is incorporated herein.

Claims 22-26, 30, 31, 33-38, 41-45, 49, 50 and 52-57, the rationale provided in the rejection of claims 3-7, 11, 12 and 14-19 is incorporated herein.

5. Claims 2-17, 21, 27-29, 32, 40, 46-48 and 51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sowar (5,351,196) in view of Ji et al. "Machine Interpretation of CAD Data for Manufacturing Applications", ACM published September 1997, pages 264-311.

Claim 2, Sowar et al. does not teach blank graphs; however, Ji et al. discloses creating a cellular topology graph of the tools (pockets, slots, holes, steps, fig. 1) and blank bodies (raw stock bounded volume; see section 2.1, pages 270-273; fig. 4); extracting tool and blank graphs (parts) from the cellular topology graph (see section 4.1.2, the left column of page 278); performing a post-processing phase to integrate results from the extracted tool and blank graphs (parameter extraction obtains the position, orientation and dimensions of the features. Adjacent features may be combined to form compound features for a hierarchy of features, see the left column of page 286). It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize a cellular topography graph of the tools and apply a method of parameter extraction taught by the Ji's teaching into the tool paths of the Sowar' s system for building a topography graph of the tools and blank bodies, because

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the advantage of a hierarchical description (topography graph) of the extracted features is that it provides a more global view of the part which can be used in CAD/CAM evaluation of designs (see the bottom on the left column of page 277). Further, **claims 8-10 and 13**, Ji et al. also teaches the pre-processing performs cellular decomposition on the tool body and blank body to create the cellular topology graph (cell decomposition, see the left column of page 271); adding termination vertices to the tool graph (The concepts of adding and subtracting elementary volumes, see the right column of page 271 to page 272, fig. 4d); deriving bundle graphs from the tool graph that to determine the potential "from" and "to" termination ("through step", "through slot", see fig. 1a, page 267; fig. 7, page 279); a graph whose vertices represent cells used to create an output body (fig. 4d).

Claims 3-7, Sowar et al. discloses the pre-processing labels (or marks) faces and edges of the tool (part model; col. 8, lines 25-29) and blank bodies (stock model; col. 9, lines 13-14); tracking which faces came from which body (col. 9, lines 28-29); propagate edge attributes for each face (manufacturing attributes can range from simple to complex to the face, see col. 8, lines 30-35); the faces and edges are labeled with attributes (col. 3, lines 15-18); construct a blank body (well-defined the raw stock models, col. 4, lines 16-19).

Claims 11 and 12, Sowar et al. teaches the analysis performs label propagation (attributes can range from simple to complex) in which marking of faces as a from-face or to-face adjacent to faces originally marked as from-faces and to-faces (one or more cutting tools, selection of the machining operation through each machining stage, see

col. 8, lines 30-50); handling a specific termination type relative to the bodies (delta volumes, col. 14, lines 36-41).

Claims 14-17, Sowar et al. discloses results from the analysis according to the Boolean operation (col. 3, lines 42-53); a truncated tool body (the stock model that will be cut or remove on the machine tool) computed as union of cells of the tool body (solid models stock model, delta volumes, machining setup models, col. 4, lines 17-24); a truncated (subtracted) tool body computed from the Boolean of the tool body (part model) with a blank body (stock model), a target body (delta volume) (col. 4, lines 34-36; col. 9, lines 17-27).

Claims 21, 27-29, 32, 40, 46-48 and 51, the rationale provided in the rejection of claims 2, 8-10 and 13 is incorporated herein.

Response to Arguments

6. Applicant's arguments filed 11/26/03 have been fully considered but they are not persuasive.

With respect to applicant's arguments, Sowar's reference shows the limitations of independent claims 1, 20 and 39 as explained in the Office Action. Claim 1, Sowar et al. discloses generating a planar profile of curves (generating a slicing plane which is intersected with the solid modeling faces to determine the curves representing regions that the tool may enter; col. 3, lines 24-26 or organizing the curve into profiles, col. 13, lines 9-10; figs. 11A and 11B); sweeping the profile along a specified path (tool path) to generate a tool body (a tool volume is an exact solid model that represents the total volume of space swept out by cutting tool during complete traversal of the NC tool path;

col. 14, lines 9-12); terminating the swept profile when the tool body interacts with blank bodies to a predefined extent (if all delta volumes have been removed (blank bodies), the process terminates, col. 14, lines 36-37); this is done by projecting the constraint profile through the z extent of the delta volume (col. 11, lines 44-60), the z-extents are needed to determine start and stop positions for slicing and control (col. 11, lines 23-27). These features considered corresponding to the step of terminating the swept profile when the tool body interacts with a plurality of blank bodies to a predefined extent which disclosed by the claimed invention, because z extent for a delta volume are predetermined, maintained and supplied by the underlying solid modeling system (col. 11, lines 25-27). For these reasons, the rejection of claims 1-57 are maintained.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Kimbinh Nguyen** whose telephone number is **(703) 305-9683**. The examiner can normally be reached **(Monday- Thursday from 7:00 AM to 4:30 PM and alternate Fridays from 7:00 AM to 3:30 PM)**.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Zimmerman, can be reached at (703) 305-9798.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

Or faxed to:


(703) 872-9314 (for Technology Center 2600 only)

Hand-delivered responses should be brought to Crystal Part II, 2121 Crystal Drive, Arlington, VA, Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office whose telephone number is (703) 306-0377.

Kimbinh Nguyen

April 12, 22004


MARK ZIMMERMAN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600